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Capturing Student's Spontaneous Knowledge Transfer Between Block and Text-Based Programming Languages

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Abstract

Transferring knowledge to new situations is essential for learning (Gentner, 2003) but notoriously difficult (Gick & Holyoak, 1983). In computer science education, students are expected to transfer knowledge of earlier taught block-based programming languages (e.g., Scratch) when they transition to more challenging text-based languages (e.g., Python). However, still little is known about whether and how students engage in such transfer. To explore these ideas, we developed an assessment for late-elementary and middle-school students proficient in Scratch that provides brief instruction on similarities with a novel text-language (Python) for various concepts (conditionals, iteration, etc.). Students were then assessed as to whether they could transfer their knowledge to conceptually related problems in Python. Results indicate students struggle in transferring most concepts, particularly those with syntactic differences. These findings are consistent with ACT-R theory (Anderson & Schunn, 2000) and suggest students may benefit from targeted transfer support when learning new programming languages.

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